1,152,795

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,152,795

Date of Application and filing Complete Specification: 13 April, 1967.

No. 17054/67.

Application made in United States of America (No. 545,682) on 27 April, 1966.

Complete Specification Published: 21 May, 1969.

Index at acceptance:—B5 A(1R20, 8)

Int. Cl.:—B 29 c 17/07

COMPLETE SPECIFICATION

Method and apparatus for making Hollow Articles of Organic Plastics Material

I, EMERY IMRE VALYI, a citizen of the United States of America, of 5200 Sycamore Avenue, Riverdale, New York 10471, United States of America, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method and apparatus for making hollow articles of organic plastics material and more particularly to the simultaneous injections and the simultaneous blowing of a plurality of such hollow articles.

According to one aspect of the present invention there is provided a method of making a plurality of blown hollow articles from a corresponding number of parisons which method comprises injecting a hot flowable plastics material into a plurality of parison mold cavities and onto a blow core in each cavity, transferring the blow cores with the formed parisons thereon from the parison mould cavities along a predetermined first path into a blow station, enclosing the blow cores and the parisons in the blow station in a blow mould having a central part and a pair of opposed outer parts and having a plurality of blow cavities therein, blowing the parisons into the blow mould cavities to form the hollow articles, retracting the blow cores from the articles, retracting the outer blow mould parts from the central part out of the path of the blow cores along a predetermined second path normal to the first path, the parts of the blow mould having parting lines extending through the mould cavities in a direction normal to the second line, shifting the central part out of the path of the blow cores, to a discharge station along a predetermined third path normal to the first path, and returning the blow cores along the first path to the parison mould cavities.

According to another aspect of the present invention there is provided apparatus for making blown hollow articles comprising a plurality of blow cores adapted to carry parisons for blowing, the parisons being formed by the injection of a hot plastics material onto the blow cores, the blow cores being shiftable in a predetermined first path from an injection station to a blow station, a blow mould at the blow station having a center part and a pair of outer parts, a series of blow cavities adapted to receive the blow cores and parisons, the outer parts being shiftable away from the center part along a predetermined second path normal to the first path, the parts having parting lines extending through the mould cavities in a direction normal to the second path, the center part being shiftable in a third path normal to the first path, the blow mould parts when retracted along the second and third paths, respectively, providing clearance for the movement of the blow cores along the first path.

Illustrative embodiments of the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a partial longitudinal section of one form of moulding apparatus;

Figure 2 is a similar section showing the parts in blowing position;

Figure 3 is a transverse section taken on the line 3—3 of Figure 1 showing the arrangement of the injection and separated mould cavities;

Figure 4 is a transverse section taken on the line 4—4 of Figure 2 showing the arrangement of the blow mould parts;

Figure 5 is a section similar to Figure 4 illustrating a six-cavity blow mould; and

Figure 6 is a section similar to Figure 4 illustrating an eight-cavity blow mould.

Referring to the drawings more in detail the apparatus of the invention is shown in Figures 1 to 4 as embodied in a parison moulding and blowing apparatus comprising an injection or parison moulding station including an outer

[*Price 4s. 6d.*]

die member 10 having four parison forming cavities 11, the centers of which are uniformly spaced around a circle indicated by dash line 12 (Fig. 3). Each cavity 11 communicates with an injection nozzle 13 located at its center and joined by radial passages 14 to a passage 15 located at the center of the circle 12 through which hot flowable organic plastics material is supplied to all of the parison cavities. The passages 14 are all of the same length so that the injection paths, from the center passage 15 to all of the cavities 11, are equal. This ensures that all of the parisons are injected with plastics material under the same conditions of temperature and pressure so as to provide uniformity in the products.

Each parison is injected onto a blow core 20 which is coaxial with the cavity 11 and is shaped to form the inner die member. The blow cores 20 are mounted on a common carrier 21 and are of standard construction, including air passages and control elements, not shown.

With the parts in the position shown in Fig. 1, a parison 25 is injected onto each of the blow cores 20 in the injection cavities 11. The blow cores 20, with the formed parisons thereon, are then retracted from the outer die member 10 into a blow station as illustrated in Fig. 2. In this station a blow mould composed of a center part 30 (see Fig. 3) and a pair of outer parts 31 is closed about the parisons 25. The center part 30 and the outer parts 31 have blow cavities 32 formed therein in registration with each of the blow cores. The center part 30 and the outer parts 31 are joined along a parting line 33 which extends diametrically through all of the cavities 32 in a direction normal to the direction of movement of the outer parts 31. In the embodiment of Fig. 4, two cavities 32 are located on each side of the center line 36 of the center part 30, the parts 31 move in a direction normal to this center line 36, as indicated by the arrows 34, and the parting line 33 extends parallel to the center line 36 of the part 30.

After the parisons 25 have been blown in the cavities 32 to form hollow articles 35, the outer parts 31 are shifted transversely as indicated by the arrows 34 to release the articles 35 which remain in the part of the cavities 32 of the center part 30, suitable known means being provided to cause the blown articles 35 to be retained in the cavities of parts 30 and to be shifted therewith to a discharge station in the direction indicated by arrow 37. Alternately, articles 35 may be retained in parts 31 until discharged.

After blowing and prior to the opening of the blow mould, the blow cores 20 are retracted from the blow mould cavities and from the blown hollow articles so as to provide clearance for the movement of the blow mould parts. With the hollow articles formed and with the outer blow mould parts 31 separated along a path indicated by the arrows 34, the center part 30 is retracted from blow position out of the path of the blow cores 20 in a direction normal to the direction of movement of the outer parts 31 as indicated by the arrow 37. The blow mould parts are thus shifted out of the path of the blow cores 20 to the upper position indicated in Fig. 1 and the blow cores are again advanced into the outer parison die member 10 for the injection of another set of parisons in a repeated cycle.

The embodiment of Fig. 5 illustrates a blow mould composed of a central part 40 and outer parts 41 having six blow cavities 42 with their centers uniformly spaced around a circle 43 indicated by a dash line and arranged three on each side of a center line 44. The parting line 45 extends parallel to the center line 44 and is offset along lines 46 between the center cavity and the upper and lower cavities. The arrangement is such that the parting line 45 extends diametrically through all of the cavities in a direction normal to the direction of the parting movement of the outer parts 41, which is indicated by the arrows 47.

Fig. 6 illustrates the invention applied to an eight-cavity mold. In this form the mould comprises a center part 50 and outer mold parts 51 with eight mould cavities 52 having their centers arranged along a circle 53, with four on each side of the center line 54. The parting line 55 in this case extends parallel to the center line 54 diametrically through each cavity and offset along lines 56 between the two upper and the two lower cavities. Here again the parting line through each cavity extends diametrically and normal to the direction of movement of the outer mold parts as indicated by arrows 57.

In all of these forms, the cavities are equidistant from the center of the circles passing through their centers so that the radial passages, from the central injection passage to the separate injection nozzles, are all of the same length. The parting lines are so arranged that the blown articles are extracted from the center parts of the blow mold when the outer parts are shifted in the manner shown in Figs. 1 and 2. The arrangement of the parts is otherwise the same as shown in Figs. 1 and 2.

While four, six and eight cavity moulds have been shown, it is obvious that the moulds may embody and desired number of cavities having a similar arrangement.

A three-part blow mould has been shown but the mould may be formed with additional parts, if convenient, depending upon the zize and arrangement of the parts. It is to be understood that in each case the number and arrangement of the parison die cavities will be the same as that of the blow mold cavities and that a one piece parison die member or a multiple part parison die may be used depending upon the shape of the cavities and

upon whether it is necessary to part the parison die to release each parison. If the parison die is to be parted, it may be formed in three or more parts and the cavities and parting lines arranged in the same way as shown for the blow molds above described. The various parts may be mounted and actuated by standard means. Only so much thereof has been shown as is necessary to an understanding of the present invention.

WHAT WE CLAIM IS:—

1. A method of making a plurality of blown hollow articles from a corresponding number of parisons which method comprises injecting a hot flowable plastics material into a plurality of parison mold cavities and onto a blow core in each cavity, transferring the blow cores with the formed parisons thereon from the parison mould cavities along a predetermined first path into a blow station, enclosing the blow cores and the parisons in the blow station in a blow mould having a central part and a pair of opposed outer parts and having a plurality of blow cavities therein, blowing the parisons into the blow mould cavities to form the hollow articles, retracting the blow cores from the articles, retracting the outer blow mould parts from the central part out of the path of the blow cores along a predetermined second path normal to the first path, the parts of the blow mould having parting lines extending through the mould cavities in a direction normal to the second line, shifting the central part out of the path of the blow cores, to a discharge station along a predetermined third path normal to the first path, and returning the blow cores along the first path to the parison mould cavities.

2. A method as claimed in claim 1 in which the blown articles remain in the central part of blow mould and are shifted therewith to a discharge point.

3. Apparatus for making blown hollow articles comprising a plurality of blow cores adapted to carry parisons for blowing, the parisons being formed by the injection of a hot plastics material onto the blow cores, the blow cores being shiftable in a predetermined first path from an injection station to a blow station, a blow mould at the blow station having a center part and a pair of outer parts, a series of blow cavities adapted to receive the blow cores and parisons, the outer parts being shiftable away from the center part along a predetermined second path normal to the first path, the parts having parting lines extending through the mould cavities in a direction normal to the second path, the centre part being shiftable in a third path normal to the first path, the blow mould parts when retracted along the second and third paths, respectively, providing clearance for the movement of the blow cores along the first path.

4. Apparatus as claimed in claim 3 in which the center part is adapted to retain the blown articles when the outer parts are retracted and is shiftable along the third path to a discharge point.

5. Apparatus as claimed in claim 3 or claim 4 in which the blow mould contains at least four cavities arranged two on each side of a center line and the parting lines being parallel to the center line.

6. Apparatus as claimed in claim 5 in which the mould contains at least six cavities arranged symmetrically on opposite sides of a center line which is normal to the path of movement of the outer mould parts and the parting lines are parallel to the center line and offset between at least some of the cavities.

7. Apparatus as claimed in any one of claims 3 to 6 which includes a parison die having a plurality of cavities corresponding to the blow mould cavities, one of the blow cores being positioned in each of the cavities and forming an inner die member to receive the parison, means for transferring the blow cores as a unit from the die cavities in a predetermined first path to the blow mould at a blow station spaced from the parison mould, the blow mould parts being closable around the blow cores and parisons when the latter have been shifted to the blow position and being retractable along the second and third paths, resepectively, to provide clearance for the return of the blow cores to the parison die after the blown articles have been removed from the blow cores.

8. Apparatus for making a plurality of hollow articles constructed and arranged substantially as hereinbefore described with reference to and as shown by Figures 1 to 4, and Figure 5 or Figure 6 of the accompanying drawings.

9. A method of making a plurality of hollow articles substantially as hereinbefore described with reference to Figures 1 to 4, and Figure 5 or Figure 6 of the accompanying drawings.

10. Hollow articles formed by the method of any one of claims 1 or 2 or claim 9 or by using the apparatus of any one of claims 3 to 8.

J. A. KEMP & CO.,
Chartered Patent Agents,
14 South Square,
Gray's Inn, London, W.C.1.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1969.
Published by the Patent Office, 25 Southampton Buildings, London, W.C.2, from which copies may be obtained.

FIG. 1

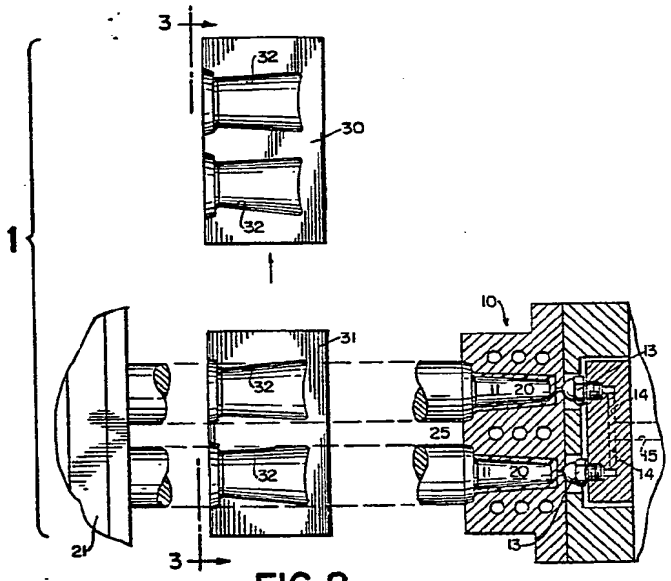
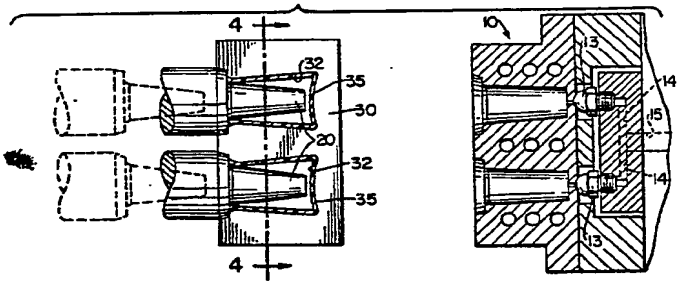

3
32
30
32
10
31
32
20
13
14
25
45
32
20
14
21
3
13

FIG. 2


4
32
35
30
20
32
35
4
10
13
14
15
14
13

1152795 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheets 1 & 2

FIG. 3

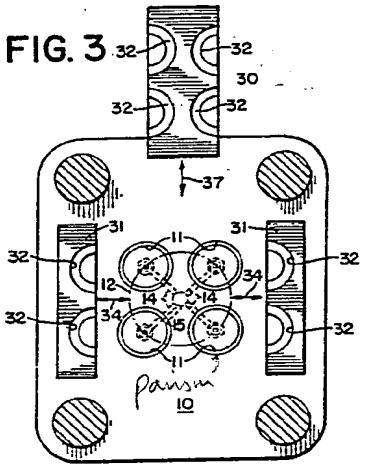
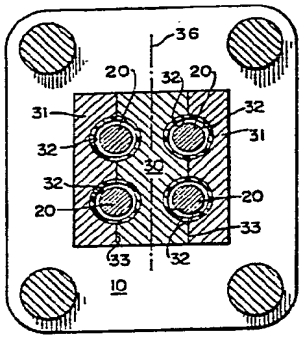
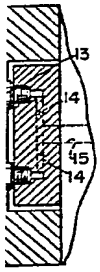


FIG. 4





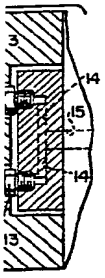


FIG. 5

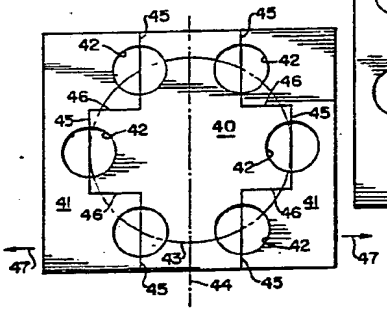


FIG. 6